

Appendix D – Best Management Practices

Proposed treatments shown as “clearcut with reserves” in Specialist Reports are referred to as “Seed tree harvest” in the Environmental Assessment and Appendices.

Appendix D – Best Management Practices

Best Management Practices for the Conger Project Newport-Sullivan Lake Ranger Districts Colville National Forest

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INTRODUCTION

Best Management Practices (BMPs) are the primary mechanism to enable the achievement of water quality standards (Environmental Protection Agency 1987). General BMPs were reviewed, selected and tailored for site-specific conditions to arrive at the project level BMPs for the protection of water quality. Forest Services management practices will meet, as a minimum, the substantive State BMP requirements, and other considerations required by the National Forest Management Act (NFMA), and other authorities, for the protection of the soil and water resource.

FORMAT OF BEST MANAGEMENT PRACTICES

Each general Best Management Practice (BMP) listed consists of the Title, Objectives, Explanation, Implementation and responsibility, and Monitoring. Evaluations of ability to implement and effectiveness were made at the project level.

Title: Includes the sequential number of the practice and a brief title

Objective: Describes the objectives of the Best Management Practice (BMP).

Explanation: Describes how this practice would be applied to this project.

Implementation and responsibility: Identifies the people and mechanisms responsible for implementing the BMP.

Ability to implement: Provides a qualitative estimate of the ability of the Forest Service to implement the BMP.

- High: Almost certain the BMP can be implemented as planned.
- Moderate: Greater than 75 % certainty the BMP can be implemented as planned.
- Low: Less than 75 % certainty the BMP can be implemented as planned.

Effectiveness: Provides a qualitative assessment of the expected effectiveness that the applied measure will have on preventing or reducing impacts on water quality and beneficial uses.

- High: Practice is highly effective (> 90 %) and one or more of the following types of documentation are available:
 - a. Literature/Research - must be applicable to area.
 - b. Administrative studies - local or within similar ecosystem.
 - c. Experience - judgment of an expert by education and/or experience.
 - d. Fact - obvious by reasoned (logical) response.
- Moderate: Documentation shows that the practice is effective less than 90 % of the time, but at least 75 % of the time or logic indicates that this practice is highly effective, but there is little or no documentation to back it up.
- Low: Effectiveness unknown or unverified, and there is little or no documentation; or applied logic is uncertain in this case, or the practice is estimated to be less than 75 % effective.

Monitoring: Either describes how the site-specific practices for this BMP will be monitored.

CONGER PROJECT BEST MANAGEMENT PRACTICES

TIMBER AND VEGETATION MANAGEMENT

PT-1. Title: Timber Sale and Vegetation Management Planning Process

W-5. Title: Cumulative Watershed Effects

Objective: To introduce water quality and hydrologic considerations into the planning process.

Explanation: The planning process identifies problems and provides for administrative controls, corrective treatments, and preventive measures.

Implementation and responsibility: Parts of the project planning and evaluation of the effects were done under contracts. The fish analysis was conducted by Jeremy Sikes and Dautis Pearson of URS. The hydrology analysis was conducted by Anne MacDonald, Jennifer Renninger, and Chris Watson of URS. The soil analysis was conducted by Nancy Glines. The analyses included direct, indirect and cumulative effects. The analysts recommended practices to protect water quality.

A Forest Service ID Team reviewed the analyses, and identified the final practices and mitigations. This team included a hydrologist (Bert Wasson), two fish biologists (Amanda Kunzmann and Tom Shuhda) and a soil scientist (Nancy Glines).

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Planning quality is monitored by the Forest Environmental Coordinator (Jim Parker) in his review of the final EA and analysis file.

PT-2. Title: Treatment Unit Design

Objective: To ensure that timber harvest and other vegetation treatment units will secure favorable conditions of water flow, water quality and fish habitat.

Explanation: This is an administrative and preventive practice.

Implementation and responsibility: The hydrologic survey and evaluation of proposed treatments was accomplished through the planning process. Streams were excluded from the timber sale units. Wetlands within the timber sale units were identified. Streams may occur within the prescribed fire treatment areas, and the fire prescription will be modified to minimize erosion and protect riparian resources. Actual timber sale unit layout is accomplished by the pre-sale forester, who is responsible for excluding streams according to their prescription. The fuels specialist is responsible for identifying streams on the burn plans and other fuel treatments. The Timber Sale Administrator (TSA) or Contracting Officers Representative (COR) is responsible for monitoring on-the-ground activities.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Unit layout is periodically monitored through pre- and post-sale reviews.

PT-3. Title: Use of Erosion Potential Assessment for Timber Harvest Unit Design

Objective: To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.

Explanation: This is a preventive practice. The erosion potential and mass wasting potential was determined using maps and on-the-ground review. Areas with high potential for erosion were visited to determine if special mitigation was required. Areas with high erosion potential coincide with steep slopes; these areas will be treated using skyline or helicopter yarding systems.

Implementation and responsibility: This was accomplished by the hydrologist and soil scientist.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest reviews will be the primary mechanism to determine if the erosion potential assessment was adequate and whether the proposed treatments were effective.

PT-4. Title: Use of Sale Area Maps for Designating Water Quality Protection Needs

Objective: To delineate the location of areas to be protected.

Explanation: This is an administrative and preventive practice. The purpose of the map is to notify the Purchaser, TSA and others of the location of features to be protected.

Implementation and responsibility: A list of known streams and wetlands within and adjacent to the treatment areas may be found at BMP-PT-7. The Sale Preparation Forester is responsible for preparation of the Sale Area Map.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Sale Area Map is checked by the Sale Preparation Forester, engineers, and watershed specialists to assure accuracy. Accuracy is also checked during post-harvest reviews.

PT-5. Title: Limiting the Operating Period of Timber Sale Activities

Objective: To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

Explanation: The TSC specifies a Normal Operating Season, during which, operations may generally proceed without resource damage. Operations are permitted outside the Normal Operating Season only when they can be conducted without damage to soil, water, and other resources. For post-sale activities, heavy equipment will be similarly limited to the dry season.

Implementation and Responsibility: Limited operating periods are identified and recommended during the Timber Sale Planning Process by the interdisciplinary team and followed through the life of the timber sale primarily by the Sale Administrator. For this project the Normal Operating Season will be from June 1 through October 31. Winter logging is specified for the area adjacent to the Batey-Bould Trail, and may occur in other areas with adequate snow conditions.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Timber Sale Administrator and COR (post-sale activities) keep track of when activities occur, weather, and ground conditions.

PT-7. Title: Riparian Habitat Conservation Area (RHCA) Designation

Objective: To designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential adverse effects of nearby logging and related land disturbance activities on water quality and beneficial uses.

Explanation: For this project, the RHCA's will be the standard required under the Inland Native Fish Strategy – Category 1 fish-bearing streams are 300 feet, Category 2 perennial, non-fish bearing streams are 150 feet; intermittent streams and wetlands less than 1 acre are 50 feet; wetlands greater than 1 acre are 150 feet. A map of the streams and the RHCAs are located in the analysis file. The following table lists the known streams and wetlands located within proposed timber sale units.

Table 1. Riparian Habitat Conservation Areas Designated

Stand	Type	Width	Comment
3017351	Wetland <1 ac.	50 feet	Seep midslope.
3017368	Wetland <1 ac.	50 feet	Spring and small perennial stream
	Category 2 stream	150 feet	through stand.
3017411	Category 2 stream	150 feet	Perennial stream.
3017413	Category 2 stream	150 feet	Perennial stream through the northeast corner of the stand.
3017419	Wetland < 1 ac.	50 feet	Seeps among the rocks on the north side of the stand.
3017420	Wetland < 1 ac.	50 feet	Seep in the southwest corner.
3017427	Intermittent stream	50 feet	Intermittent stream through stand.

3017438	Wetland < 1 ac.	50 feet	Seeps along the road below the proposed treatment stand.
3017439	Wetland < 1 ac.	50 feet	Seeps along the road below the proposed treatment stand and in the lower part of the stand.
3017493	Wetland > 1 ac.	150 feet	Large spring complex and forested wetland in the north third of the stand.
3017501, 3017502	Wetland < 1 ac.	50 feet	Springs in the southwest portion of the stand.

No timber harvest would occur in these RHCAs. Fuel storage and refueling will not be done within RHCAs. RHCA's will not be subjected to prescribed fire that would remove the soil protection afforded by the duff layer or adversely impact riparian vegetation. Where possible, fireline construction in riparian areas will be avoided; fire may be allowed to back down into riparian areas if such actions will not retard attainment of riparian objectives.

Implementation and responsibility: The Sale Preparation Forester is responsible for the inclusion of the special management areas in the TSC and Sale Area Map, as identified in the EA or EIS and analysis files. The Sale Administrator is responsible for TSC compliance during harvest operations.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest reviews will consider whether the RHCAs were adequate.

PT-8. Title: Streamcourse and Wetland Protection

VM-2. Title: Tractor Operation Excluded from Wetlands and Meadows

W-3. Title: Protection of Wetlands

Objective: To protect stream integrity and avoid management-induced flow obstructions and sediment introduction; to protect the water storage and conveyance functions of wetlands by avoiding soil displacement, rutting, and flow concentrations.

Explanation: In most cases, stream protection will be automatically ensured by exclusion of RHCA's from harvest units. In addition, the following management controls and practices will be incorporated into the TSC:

- Since these areas have been excluded from the timber sale unit, skidding, CTL trails, and temporary roads are not expected to occur within the RHCAs. If they should occur, the sale administrator must approve in advance and on the ground, the location, method, and timing of crossings.
- All other ground disturbing equipment (e.g., grappling piling equipment) is excluded from working within RHCAs or wetlands.
- Logs will be fully or partially suspended during cable yarding operations within the RHCA, and will be fully suspended over the protected streams and wetlands.

- d. All project debris will be removed from stream channels if it would block or pollute flows. Trees felled over or in protected stream courses (e.g. cable corridors, road right-of-way) that do not block flow will be left unless the Forest Service Representative directs otherwise.
- e. Waterbars or other erosion control structures constructed nearby will be designed so as to disperse concentrated flow of water and permit the forest floor to trap and retain sediment before it reaches a stream channel.

Implementation and Responsibility: The pre-sale forester is responsible for inclusion of the relevant clauses in the TSC and for ensuring that unit layout minimizes the number of channel crossings needed for the temporary transportation system. The sale administrator is responsible for on-the-ground implementation that achieves the stated objectives. If temporary road construction in any RHCA be deemed necessary, the sale administrator will consult with road engineering and/or watershed staff to determine appropriate standards for the crossing structure.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Implementation will be documented by the TSA in the Timber Sale Inspection Report. The effectiveness of methods used to cross RHCAs will be monitored during post-sale reviews.

PT-9. Title: Determining Tractor Loggable Ground

VM-1. Title: Slope Limitations for Tractor Operation

Objective: To protect water quality from degradation caused by ground-disturbing machinery such as tractors, excavators, processors, and forwarders.

Explanation: *Tractor and skidder yarding would be limited to slopes less than 35%. Short pitches may be steeper. Avoid long steep skid trails.*

Cut-to-length logging would be limited to slopes less than 40%. Short pitches may be steeper, such as the access from the road.

The determination whether any given treatment area would provide enough slash to be logged with a CTL would be done during the timber sale preparation phase, when the prescription is written and the timber is cruised. If, at that time, it doesn't look like the stand will generate enough slash, CTL logging would not be allowed unless some other buffer material is used (e.g., snow). If a treatment area is too steep for a tractor, and would not provide enough slash for a CTL, it would be treated with a skyline or helicopter yarding system.

Several stands identified as "ground-based" include areas that are too steep to log with a tractor and some include areas too steep to log with a CTL (stands 3017219, 7351, 7376, 7378, 7379, 7399, 7400, 7413, 7414, 7419, 7420, 7454, 7480, 7496, 7543). The Timber Sale may exclude these steep areas, or may change the logging system for these steep areas.

Wide-spread grapple piling is not anticipated for this project. If some grapple piling is deemed necessary, grapple equipment is held to the same slopes as tractors because they typically result in bare soil conditions.

Implementation and responsibility: *The final decision on logging system (tractor, cable, skyline, helicopter) is done by the Sale Preparation Forester. When designating skid trails, it is the responsibility of the Timber Sale Administrator (TSA) to avoid steeper areas and to avoid long, steep trails.*

Land suitable for tractor logging is identified in the pre-sale phase of the timber sale planning process. Provisions in the TSC specify the areas and conditions upon which tractors can operate. Requirements governing tractor operations are incorporated in the TSC.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Sale Administrator oversees the operation to ensure compliance.

PT-10. Title: Log Landing Location

Objective: To locate landings in such a way as to minimize creation of hazardous watershed conditions.

Explanation: All landings will be approved prior to clearing, or located by the Forest Service, under provisions of the TSC. The following criteria are used in evaluating landings:

- a. To the extent practical, old landings and roads will be utilized.
- b. Landings will not be located within RHCAs.
- c. The cleared or excavated size of landings shall not exceed that needed for safe and efficient yarding and loading operations.
- d. Landing locations are selected on the basis of the least amount of excavation and erosion potential, where sidecast will neither enter drainages nor damage other sensitive areas.
- e. Landings are located so that designated timber can be yarded with minimal disturbance to the RHCAs, streams and wetlands.

Implementation and responsibility: The Sale Administrator ensures that the landings are located and constructed according to the TSC.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest reviews consider whether the log landing location was appropriate.

PT-11. Title: Tractor and CTL Trail Location and Design

Objective: To minimize the area compacted, erosion, and runoff water. No more than 20% of each harvest unit may have detrimental soil conditions including compaction, displacement and erosion.

Explanation: Skid trails and temporary roads will be designed to facilitate erosion control and de-watering.

For tractor units, the skid trails should be at least 130 feet apart except when converging i.e., at landings or to avoid streams or rock outcrops. It is especially important for tractor skid trails to be designed to facilitate erosion control and dewatering.

For CLT units, forwarder trails should be about 40 feet apart and effectively buffered with slash or snow.

- *If a CTL trail is buffered with slash, the slash will be placed on ground ahead of the timber-felling machine to minimize compaction; and the same trail will be used by the forwarder. The slash needs to be at more than 10 inches deep prior to compaction by the equipment to provide sufficient compaction buffering.*
- *If a CTL trail is buffered with snow, a snowpack of about 10-24 inches¹ will generally protect soil from compaction. Snow over frozen soil is the most effective.*

Implementation and responsibility: Sensitive areas, including steep and unstable ground, drainages, and high water table soils are identified in the soil report, the silviculturist unit cards, and the individual unit cards.

The Sale Administrator locates the skid trails with the timber Purchaser prior to use.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Sale Administrator observes operations and watershed specialists visually monitor implementation of this BMP periodically throughout implementation.

PT-12. Title: Suspended Log Yarding in Timber Harvesting

Objective: To protect soils from excessive disturbance and to protect the integrity of streams and other sensitive watershed areas

Explanation: Suspended log yarding includes skyline and helicopter yarding systems. Ground disturbance is reduced by suspending logs either partially or wholly above the ground while transporting them to the landing. Skyline is in stands proposed in stands 3017351, 3017358, 3017368, 3017434, 3017462, 3017493, and 3017501. Each unit was reviewed; all the stands have adequate suspension. Where suspension is good, the amount of bare ground is limited to a few skyline corridors as they approach the landing. Small areas of gouged, mixed of the duff and surface soil, and bearing of the soil are expected in the cableways below the landing.

¹ The snow depth is to be measured in the openings. This is expected to equal about 12-14 inches of snow under the tree canopy.

Implementation and responsibility: The final decision to designate a unit skyline or helicopter is done by the Sale Preparation Forester. If suspension is insufficient for a skyline system, the system will be changed or the unit modified.

Ability to implement: **Moderate**

Effectiveness: **High**

Dryness (1967) found skyline harvesting disturbed about 6% of the site. Smith and Wass (1977) measured 7.6% disturbance. McIver and others (1998) measured about 7% disturbance under skyline yarding systems. Most of the disturbance found was shallow disturbance to the duff and shallow mixing of duff and surface soils – not generally detrimental soil conditions as defined by the Forest Plan.

Monitoring: Post-harvest reviews.

PT-13. Title: Erosion Prevention and Control Measures During Timber Sale Operations

VM-4. Title: Soil Moisture Limitations for Tractor Operation

Objective: To ensure that the Purchaser's operations shall be conducted to minimize soil erosion.

Explanation: The TSC will include contract clauses to protect water quality. Equipment shall not be operated when ground conditions are such that excessive damage will result. The kinds and intensity of control work done by Purchaser shall be adjusted to ground and weather conditions and the need for controlling runoff. For post-sale activities, heavy equipment will be similarly limited to dry conditions.

Erosion control work (e.g., cross drains on tractor skid trails) shall be kept current before expected seasonal periods of precipitation or runoff.

Implementation and responsibility: The Sale Administrator and Forest Service Representative oversee implementation. Specialists are available for advice as needed.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: TSA and ER will report ground conditions in daily documentation.

PT-14. Title: Revegetation of Areas Disturbed by Harvest Activities

VM-3. Title: Revegetation of Surface Disturbed Areas

Objective: To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.

Explanation: Where soil has been severely disturbed by the Purchaser's operations, the Purchaser shall take appropriate measures normally used to establish an adequate cover of grass or other vegetation, including the application of seed or other agreed upon

stabilization measures. This typically occurs on tractor skid trails, in small areas of CTL trails, and in some skyline corridors.

If areas are disturbed by post-sale activities the Contractor or the Forest Service will take the appropriate measures to establish an adequate vegetative cover.

Implementation and responsibility: An estimate of the need is included in the timber sale appraisal and included in the TSC. The Timber Sale Administrator is responsible for seeing these areas are seeded appropriately. Post-sale the COR is responsible for seeing these areas are seeded.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest reviews.

PT-15. Title: Log Landing Erosion Prevention and Control

Objective: To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigating measures.

Explanation: This practice uses administrative, preventive, and corrective controls to meet the objective. Design landings to facilitate drainage and erosion control. Use existing roads and landings if they are suitable. Also see BMP PT-

Implementation and responsibility: Timber Sale Contract requirements provide for erosion prevention and control measures on all landings. Provisions are made in the Timber Sale Contract for landings to have proper drainage. After landings have served the Purchaser's purpose, the Purchaser shall ditch or slope the landings to permit the drainage and dispersion of water. Provisions are also made for revegetation. The specific work for each landing will depend on the actual ground conditions. It is the responsibility of the Sale Administrator to ensure that this practice is properly implemented on the ground. The mechanisms for implementing this BMP are Contract Provisions BT6.6 (Erosion Prevention and Control), BT6.64 (Landings), and CT6.6 (Erosion Control and Soil Treatment by Purchaser). Also see BMP PR-23 Obliteration of temporary roads and landings.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest reviews.

PT-16. Title: Erosion Control on Skid Trails

Objective: To protect water quality by minimizing erosion and sedimentation derived from skid trails.

Explanation: This practice employs preventive controls to reach the objective. Tractor skid trails will generally require erosion control structures (cross-ditches) to dewater the trail and prevent erosion. The spacing of these structures varies by slope. None of these

soils are highly erosive and the spacing would be the same throughout the project area. Construction of structures is done before seeding.

Mulching or spreading slash on the skid trails may also be required.

CTL trails typically have 90-100% soil cover and do not require erosion control structures.

Implementation and responsibility: The mechanisms for implementing this BMP are Contract Provision BT6.65 (Skid Trails and Fire Lines), and CT6.6. (Erosion Control and Soil Treatment by Purchaser).

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Timber Sale Administrator will monitor implementation during harvest operations. Implementation and effectiveness will be included in post-harvest reviews.

PT-18. Title: Erosion Control Structure Maintenance

Objective: To ensure that constructed erosion control structures are stabilized and working.

Explanation: Erosion control structures are only effective when they are in good repair and stable condition. Once the erosion control structures are constructed and seeded, there is a possibility that they may not become adequately vegetated or they may become damaged by subsequent harvest activities. It is necessary to provide follow-up inspection and structural maintenance in order to avoid these problems and ensure adequate erosion control.

Implementation and responsibility: The Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until released from that responsibility under the terms of the TSC. The Sale Administrator oversees the Purchaser's implementation of this BMP. The Forest Service may accomplish erosion control maintenance through watershed restoration practices after the Timber Sale Contract closes. The mechanism for implementing this BMP is Timber Sale Contract Provision BT6.67 (Erosion Control Structure Maintenance).

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Watershed specialists will evaluate the effectiveness of the erosion control structures and recommend additional maintenance or erosion control work.

PT-19. Title: Acceptance of Timber Sale Erosion Control Measures before Sale Closure

Objective: To assure the adequacy of required erosion control work on timber sales.

Explanation: The effectiveness of soil erosion prevention and control measures is determined by the results found after sale areas have been exposed one or more years to

the elements. Although a careful check is required before a timber sale is closed to assure that planned erosion work has been completed to the standard prescribed, the erosion prevention work done in previous years should be periodically inspected during the life of the timber sale. These inspections will help determine whether the planned work was adequate, if maintenance work is needed, the practicability of the various treatments used, and the necessity for modifying present standards or procedures.

Implementation and responsibility: Specific requirements for erosion control are included in the Timber Sale Contract(s). Sale administrators, with assistance as needed from watershed specialists, will ensure erosion control measures conform to the applicable provisions. The mechanisms for implementing this BMP are Contract Provisions BT6.6 (Erosion Prevention and Control), BT6.67 (Erosion Control Structure Maintenance), CT6.6 (Erosion Control and Soil Treatment by Purchaser), and BT6.36 (Acceptance of Work).

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Timber Sale Administrator will monitor implementation during harvest operations. Post-harvest reviews will allow ID team members to review the effectiveness of measures.

PT-20. Title: Reforestation

Objective: To reforest all suitable land harvested within five years after the regeneration cut and to promptly reforest all other suitable areas not harvested but in need of reforestation.

Explanation: All areas proposed for regeneration harvest (clearcut with reserves and shelterwood prescriptions) will be planted to ensure reforestation with desired species.

Implementation and responsibility: The silviculturist is responsible for to ensure areas of regeneration harvest are suitable, and responsible for reforesting the site (gathering and sewing the seed, working with a nursery to grow seedlings, getting the seedling planted, etc.).

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Regeneration and stocking surveys will be done by the Forest Service to verify the success of the reforestation.

PT-21. Title: Servicing and Refueling of Equipment

Objective: To prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water and other harmful materials from being discharged into or near rivers, streams and impoundments or into natural or man-made channels leading thereto.

Explanation: Landings, refueling areas, and port-a-potties will not be located within RHCAs or where spilled material might enter any streams. If equipment needs servicing,

try to move the equipment to a location that is well away from wet areas and streams. Berms or adsorbent pads may be used to contain material.

A Spill Prevention Control and Countermeasures (SPCC) Plan, certified by a registered professional engineer, is required if the volume of fuel exceeds 660 gallons in a single container or if total storage at a site exceeds 1,320 gallons (see BMP-PW-4).

Implementation and responsibility: The COR, ER, or Sale Administrator will designate the location, size and allowable uses of service and refueling areas. They will also be aware of emergency notification procedures and actions to be taken in case of a hazardous substance spill.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The TSA and ER will monitor compliance with servicing and refueling of equipment.

PT-22. Title: Modification of the TSC

Objective: To modify the TSC if new circumstances or conditions arise and indicate that the timber sale will irreversibly damage soil, water or watershed values.

Explanation: Once timber sales are sold, they are harvested as planned via the TSC. At times, however, it may be necessary to modify a TSC when it is determined that operations would cause serious environmental damage. If new evidence indicates that unacceptable damage is likely to occur, an interdisciplinary team will be assigned to assess the evidence and implications.

The EA may then be amended to reflect the findings of the interdisciplinary team. The team will make recommendations to the appropriate line officer on whether the timber sale, as currently planned, will: (1) irreversibly damage soil, water or watershed conditions, or (2) inadequately protect streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of watercourses, and deposits of sediment.

Implementation and responsibility: If the TSC, as determined by the appropriate line officer, will unacceptably affect watershed values, the TSC will be modified to protect the watershed through agreement with the timber sale Purchaser; or, the contract may be terminated by the Chief of the Forest Service, if the Purchaser does not agree to the terms of the environmental modification.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest reviews will consider whether the TSC had been or should have been modified.

ROAD SYSTEM BMPS

The only road work proposed is reconstruction of existing roads, and construction of some temporary roads. Many of the temporary roads are located on existing road prisms of unclassified roads.

PR-2. Title: Erosion Control Plan

Objective: To limit and mitigate erosion and sedimentation through effective planning prior to initiation of road construction and reconstruction activities and through effective contract administration during construction.

Explanation: Road reconstruction and temporary road construction usually result in short term erosion. By effectively planning for erosion control, sedimentation can be minimized. This erosion control plan should include measures such as silt fences and hay-bale barriers to prevent sediment from entering streams, and revegetation of disturbed areas.

Implementation and responsibility: An Erosion Control Plan, prepared by the Purchaser, is required by contract provisions. Operations cannot begin until the Forest Service has given written approval of the plan. The plan recognizes the mitigation measures required in the contract. All contracts specify that operations be scheduled and conducted to minimize erosion.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Contract packet review, prework meetings, and operating plans along with tests, measurements, and observations by the COR or ER.

PR-3. Title: Timing of Construction Activities

Objective: To minimize erosion by conducting road reconstruction operations during minimal runoff periods.

Explanation: Since erosion and sedimentation are directly related to runoff, scheduling operations during periods when the probabilities for rain and runoff are low is an essential element of effective erosion control. Contractors are to schedule and conduct operations to minimize erosion and sedimentation. Equipment shall not be operated when ground conditions are such that excessive damage will result. Such conditions are identified by the COR or ER with the assistance of watershed specialists as needed.

In addition, it is important to keep erosion control work as current as practicable with on-going operations during anticipated runoff periods. Construction of drainage facilities and performance of other contract work which contribute to the control of erosion and sedimentation shall be carried out in conjunction with earthwork operations, or as soon thereafter as practicable. The Contractor should limit the amount of area not graded to drain at any one time, and should install permanent drainage structures as soon as practical.

Implementation and responsibility: Contracted projects are implemented by the Purchaser. Compliance with plans, specifications, and the operating plan is determined with tests, measurements, and observations by the ER through inspection.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Road review process.

PR-6. Title: Dispersion of Subsurface Drainage Associated with Roads

Objective: To minimize the possibilities of roadbed and cut or fill slope failure and the subsequent production of sediment.

Explanation: Forest Roads 3116177 and 3116179 have some wet areas along the cutslope that were effectively managed during initial construction. It is unlikely reconstruction would require additional drainage. If, however, additional drainage is needed, the following are some dispersion methods might be used:

- a. pipe underdrains
- b. horizontal drains
- c. stabilization trenches
- d. drainage blankets or rock drains
- e. ditches

Dispersal of collected water should be accomplished in an area capable of withstanding increased flows. On most soils, energy dissipators need to be placed at pipe outlets. This is a preventive practice.

Implementation and responsibility: Contracted projects are implemented by the Purchaser. Compliance with project plan and specifications requirements, and operating plans is determined with tests, measurements, and observations by the COR or ER. Additional sites found during construction, or necessary changes to known sites, are designed in the same manner as the original sites.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Plan-in-hand review, design review, and road construction review process.

PR-7. Title: Control of Surface Road Drainage Associated with Roads

Objective: -To minimize sediment from roads.

Explanation: Runoff from the road template will be directed off the roadway and ditch relief will be provided at short enough intervals (based on soil type) that soil movement will be minimized outside the road clearing limits. Where it is impractical to relieve drainage in short enough intervals, ditches and roadbeds could be armored. Drainage outlets may require armoring as well.

Only reconstruction is proposed. Some of these roads don't have very good rolling dips. On some roads the ditches have been compromised. It is expected that these structures would be installed, fixed, or rejuvenated during reconstruction. "Guideline for Controlling Sediment for Secondary Logging Roads" can be used as a guide to determine spacing of drainage structures.

Implementation and responsibility: The Road Designer is responsible for applying the above guidance in the design and spacing of drainage structures and armoring. The ER will make on-the-ground adjustments during construction to meet objectives.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Road final review.

PR-9. Title: Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects

Objective: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

Explanation: The best drainage design can be ineffective if projects are incomplete at the end of the dry season. Try to get road reconstruction work done before the wet season. Utilize the erosion control measures on partially completed projects. Erosion control measures on incomplete roads may include:

- a. Installation of cross drains, diversion ditches, energy dissipators, dips, sediment basins, berms, debris racks or other facilities needed to control erosion;
- b. Removal of debris, obstructions, and spoil material from channels and floodplains;
- c. Grass seeding, placement of hay bales or silt fencing, and mulching.

Implementation and responsibility: Contracted projects are implemented by the Contractor or Purchaser. Compliance with project plan criteria, contract specifications, and operating plans is determined with tests, measurements, and observations by the COR or ER.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Road construction review process and observation during and after project completion.

PR-11. Title: Control of Sidecast Material

Objective: To minimize sediment production originating from sidecast material during road reconstruction and maintenance.

Explanation: Unconsolidated sidecast material can be difficult to stabilize and is susceptible to erosion, settling, and mass instability. No significant sidecasting is

anticipated. During road maintenance operations, the deposition of sidecast material shall be done where it will not weaken stabilized slopes.

Implementation and responsibility: Contracted projects are implemented by the Contractor or timber sale operator. Compliance with project criteria, contract specifications, and operating plans is determined with tests, measurements, and observations by the COR, ER, or maintenance engineer. Contracts and guidelines address slide and slump repair, surface blading, and the placement of waste road material to reduce sidecasting.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Road design review, progress review during construction, and maintenance activity reviews.

PR-13. Title: Diversion of Flows Around Construction Sites

Objective: -To ensure that all stream diversions are carefully planned to minimize sedimentation.

Explanation: The project proposes to replace a 36 inch diameter culvert on FR 4300468 at MP 1.1 (Graham Creek). This is a fish-bearing stream. The existing culvert would probably be replaced with a 10 foot wide arch pipe. The stream channel would be diverted, either by excavating a temporary channel or culvert. The stream would be diverted for approximately 30 days. The work would occur in July and August at low stream flows.

Implementation and responsibility: The by-pass would be designed by the Road Designer. Appropriate permits would be obtained. The ER is responsible for implementation of the design and any additional mitigation.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Progress review during construction and road construction review process.

PR-14. Title: Culvert Installation and Protection of Fisheries

Objective: To minimize sedimentation and turbidity resulting from excavation for 'in-channel' structures.

Explanation: The culvert on FR 4300468 at Graham Creek will be replaced. It is possible some culverts on medium reconstructed roads may also need replacement. Culvert replacement typically requires excavation, and waste material would be hauled to a suitable location. The Graham culvert would require a diversion (BMP PR-13). Sediment producing materials will not be left within reach of anticipated flood flows.

For Graham Creek, a fish bearing creek, the culvert will be installed in July and August. Downstream sediment basins may be necessary to mitigate impacts on low flows.

Implementation and responsibility: Contracted projects are implemented by the Contractor or Purchaser. Compliance with project criteria and the operating plan is determined with tests, measurements, and observations by the Forest Service COR or ER through inspection.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Road review.

PR-15. Title: Disposal of Right-of-Way and Roadside Debris

Objective: To ensure that debris generated during road reconstruction is kept out of streams.

Explanation: As a preventive measure, construction debris developed along roads near streams shall be disposed of piling and burning, chipping or scattering. Material will not be piled and burning within the RHCAs.

Implementation and responsibility: Contracted projects are implemented by the Contractor or Purchaser. Compliance with plans, specifications, and operating plans is determined with tests, measurements, and observations by the Forest COR or ER. Changes to disposal locations may require other resource personnel or interdisciplinary team review.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: ER will monitor compliance.

PR-16. Title: Specifying Riprap Composition

Objective: To minimize sediment production associated with the installation and utilization of riprap material.

Explanation: Rip-rap is expected to be used at the Graham Creek culvert replacement – the new fill slope at the inlet and outlet may be armored with rip rap. Rip rap will be in the 15-20 inch range (Class 3 or 4).

Implementation and responsibility: Contracted projects are implemented by the Contractor or Purchaser. Compliance with project criteria and operating plans is determined with tests, measurements, and observations by the Forest Service COR or ER.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Design review, progress review during road reconstruction.

PR-17. Title: Water Source Development Consistent With Water Quality Protection

Objective: To supply water for roads and fire protection while maintaining existing water quality.

Explanation: Water source development is normally needed to supply water for road reconstruction, dust control, and fire control. For this project, water may be obtained from the following sources – Conger Lake, Conger Pond, unnamed streams that cross FR 3116177 and 176, or Winchester Creek.

- a. Small, temporary facilities for gathering water should be constructed of sandbags containing sand, or of other materials and means which will not induce sediment in the stream.
- b. Overflow should go directly back into the stream.
- c. All temporary facilities for gathering water should be removed prior to periods of seasonal precipitation.
- d. Road approaches to the water source development should be located to minimize potential impacts in the riparian zone. These approaches should be gravel surfaced to reduce the effects of spillage from washing sediment into the stream.

Implementation and responsibility: Timber Sale Administrators, CORs and ERs are responsible for locating and developing water sources in conjunction with the Fish Biologist or Hydrologist, and the Contractor.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-sale reviews.

PR-18. Title: Maintenance of Roads

Objective: To maintain roads in a manner which provides for water quality protection by controlling the placement of waste material, keeping drainage facilities open, and by repairing ruts and failures to reduce sedimentation and erosion.

Explanation: Roads normally deteriorate because of use and weather. This deterioration can be reduced through adequate maintenance or restriction of use. All system roads will be maintained to at least the basic custodial care required to maintain drainage, protect the road investment, and minimize damage to adjacent land and resources. This level is the normal prescription for roads that are closed to traffic. Higher levels of maintenance may be chosen to reflect greater use or resource protection. Additional maintenance measures could include resurfacing, outsloping, clearing debris from ditches and cross drains, restoration of ditches, and spot rocking.

Annually, the Forest Service determines the maintenance needs of each road. Roads to be maintained by commercial users are considered. The process to accomplish maintenance activities are budgeted and contracted or scheduled for force account work. The Forest Service may collect deposits for commercial use to facilitate road maintenance and to equitably assess maintenance cost of each user.

Implementation and responsibility: Maintenance on timber sale roads is a Contractor responsibility commensurate with their use. On roads not maintained by active timber sales, the work is accomplished with Forest Service crews or by contract. Compliance with the contract provisions is determined with tests, measurements, and observations by the COR or ER.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: During a Timber Sale Contract, the TSA would monitor road conditions and maintenance.

PR-19. Title: Road Surface Treatment to Prevent Loss of Materials

Objective: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.

Explanation: Unconsolidated road surface material is susceptible to erosion during periods of precipitation. Likewise, dust derived from road use may settle onto adjacent water bodies.

Rocking of drain dips, RHCA's and their contributing areas, rocking of roadbed for sediment control and subgrade strength is included in all reconstruction proposed.

Implementation and responsibility: The Road Designer will determine the locations requiring rock and include these areas in the contract. Contracted projects are implemented by the Contractor or Purchaser. Compliance is monitored by the COR or ER.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Road construction review process.

PR-20. Title: Traffic Control During Wet Periods

Objective: -To reduce road surface damage and rutting of roads, and to lessen sediment washing from damaged road surfaces.

Explanation: The unrestricted use of roads during wet weather can result in rutting and churning of the road surfaces. All un-surfaced roads are subject to this damage.

Implementation and responsibility: Hauling activity can be controlled by the Sale Administrator or maintenance ER within active timber sales.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The TSA monitors compliance.

PR-21. Title: Snow Removal Controls to Avoid Resource Damage

Objective: To minimize the impact of melt water on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

Explanation: This is a preventive measure used to protect resources and indirectly to protect water quality. At least some units will be logged in the winter; therefore, some snow removal will occur. Rocking or other special surfacing and drainage measures may be necessary, before the operator is allowed to use the roads. Snow berms shall be removed or breached to avoid accumulation or channelization of melt water on the road and prevent water concentration on erosive slopes or soils. If the road surface is damaged, the Purchaser shall replace lost surface material with similar quality material and repair structures damaged in blading operations, unless otherwise agreed to in writing.

Implementation and responsibility: The Purchaser is responsible for snow removal in a manner which will protect roads and adjacent resources. The Timber Sale Administrator is responsible to ensure roads and resources are protected.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Forest road management inspection trips; see implementation section for tracking.

PR-23. Title: Obliteration of Temporary Roads and Landings

Objective: To reduce sediment and restore productivity of the land at the completion of intended use.

Explanation: Short-term roads constructed for a specific purpose, like logging spurs to access a landing, are temporary roads. In order to prevent continued use, such roads and landings are often obliterated at the completion of their intended use. Temporary roads that are allowed to remain in use beyond their prescribed time can become chronic sediment sources.

Effective obliteration is generally achieved through a combination of these measures:

- a. Block the entrance to these roads.
- b. Shape the roads and landings to re-establish the natural drainage configuration and any additional drainage that may be needed.
- c. Rip the road deep enough to break-up the compaction.
- d. Plant grasses, forbs, brush and/or tree species on the roadbed.

The National Forest Management Act requires that all temporary roads be returned to resource production within ten years.

Implementation and responsibility: Temporary road location and stabilization measures are determined by the Sale Administrator. Obliteration of the road to the level that it is blocked to vehicular traffic, all culverts removed, and the roadway stabilized is required by the TSC.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-sale reviews.

FIRE SUPPRESSION AND FUELS MANAGEMENT BMPS

PF-2. Title: Consideration of Water Quality in Formulating Prescribed Fire Prescriptions

Objective: To provide for water quality protection while achieving the management objectives through the use of prescribed fire.

Explanation: Effective ground cover will generally range from about 40% on flat slopes up to about 70% on steep slopes. The prescribed fire would be light enough to avoid creation of ‘burned’ soils² and hydrophobic soil conditions.

RHCA’s will not be subjected to prescribed fire that would remove the soil protection afforded by the duff layer or adversely impact riparian vegetation. Where possible, fireline construction in riparian areas will be avoided; fire may be allowed to back down into riparian areas if such actions will not retard attainment of riparian objectives.

Implementation and responsibility: The AFMO Fuels develops the burn plans based on all the resource requirements.

Ability to implement: **Moderate to high**

Effectiveness: **High.**

Monitoring: Post-sale reviews.

PF-3. Title: Protection of Water Quality During Prescribed Fire Operations

Objective: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering water bodies.

Explanation: These techniques would be used to protect water quality during prescribed burn operations:

- a. Waterbar firelines as needed.
- b. Do not construct fire lines within RHCAs unless they are absolutely necessary. To the extent possible, use wetlines to avoid handlines.
- c. Do not use pumps in streams unless absolutely necessary. If pumps are needed:
 1. The pump will have a spill containment system including a barrier and adsorbent pads.
 2. The pump would be placed so that it does not alter the streambed or pose a barrier to fish movement.
 3. Do not disturb the ground when laying out hose.

² Mineral soil surface has been significantly changed in color, oxidized to a reddish color.

Implementation and responsibility: The District FMO is responsible for carrying out the prescribed burns.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-sale review.

WATERSHED MANAGEMENT BMPS

W-4. Title: Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control and Countermeasure (SPCC) Plan

Objective: To prevent contamination of waters from accidental spills.

Explanation: A contingency plan is a predetermined organization and action plan to be implemented in the event of a hazardous substance spill.

Factors considered for each spill are the specific substance spilled, the quantity, its toxicity, proximity of the spill to waters, and the hazard to life and property.

The SPCC Plan is a document which requires appropriate measures (40 CFR 112) to prevent oil products from entering the navigable waters of the United States. An SPCC Plan is needed if the total oil products on site above-ground storage exceeds 1320 gallons or if a single container exceeds a capacity of 660 gallons.

Implementation and responsibility: The hazardous spill contingency plan identifies coordination responsibilities for various kinds of spills, as well as the names and telephone numbers of agencies to call for spill reporting and cleanup. Most spills are cleaned up by agencies or spill cleanup contractors specially equipped for the job. Disposal methods and sites will be coordinated with EPA, State, and local officials responsible for safe disposal.

SPCC Plans are required for timber sale operators and other contractors who store petroleum products. They must be reviewed and certified by a registered professional engineer.

In the event of a spill, watershed specialists will be on hand to provide advice.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: The Sale Administrator and Engineering Representative will track the implementation of this BMP throughout the timber sale.

RECREATION BMPS

P-REC-6. Title: Management of Off-Road Vehicle (ORV) Use

Objective: To provide a systematic process to aid in determining when and to what extent ORV use will cause, or is causing adverse effects on water quality.

Explanation: Stands, 3017483, 3017485, 3017486, 3017487, 3017493, 3017496, 3017501, and 3017502 are located adjacent to the Batey-Bould Trail – a motorized trail used by motorcycles. These areas will be logged in the winter, to minimize the creation of trails attractive to motorcycles. The goal is to prevent motorcycle riders from riding the temporary roads and skid trails. Prolonged use of skid trails by motorcycles generally result in continued erosion as the vegetation does not become established, and erosion control structures (waterbars) are breached and generally eventually fail.

Implementation and responsibility: The Sale Preparation Forester is responsible to ensure the TSC includes winter logging for these units. The Timber Sale Administrator is implementation and for skid trail layout.

Ability to implement: **High.**

Effectiveness: **High.**

Monitoring: Post-harvest review.

SOME BEST MANAGEMENT PRACTICES THAT WERE NOT SELECTED

T-6. Title: Protection of Unstable Lands (identification of unstable lands)

Objective: To provide for identification and appropriate management prescriptions for unstable lands.

Explanation: All the proposed activity areas were visited. No activities are planned in unstable areas.

T-17. Title: Meadow Protection During Timber Harvesting

Objective: To avoid locating roads, landings, and skid trails in meadows.

Explanation: There are no meadows within or adjacent to proposed harvest areas.

W-2. Title: Conduct Floodplain Hazard Analysis and Evaluation

Objective: To avoid, where possible, the long- and short-term adverse impacts to water quality associated with the occupancy and modification of floodplains.

Explanation: With the implementation of RHCAs, no activities are proposed on floodplains.